

Early Detection of Major Earthquakes Using Broadband Accelerometers

Authors : Umberto Cerasani, Luca Cerasani

Abstract : Methods for earthquakes forecasting have been intensively investigated in the last decades, but there is still no universal solution agreed by seismologists. Rock failure is most often preceded by a tiny elastic movement in the failure area and by the appearance of micro-cracks. These micro-cracks could be detected at the soil surface and represent useful earthquakes precursors. The aim of this study was to verify whether tiny raw acceleration signals (in the 10^{-1} to 10^{-4} cm/s² range) prior to the arrival of main primary-waves could be exploitable and related to earthquakes magnitude. Mathematical tools such as Fast Fourier Transform (FFT), moving average and wavelets have been applied on raw acceleration data available on the ITACA web site, and the study focused on one of the most unpredictable earth-quakes, i.e., the August 24th, 2016 at 01H36 one that occurred in the central Italy area. It appeared that these tiny acceleration signals preceding main P-waves have different patterns both on frequency and time domains for high magnitude earthquakes compared to lower ones.

Keywords : earthquake, accelerometer, earthquake forecasting, seism

Conference Title : ICESSDP 2019 : International Conference on Exploration Seismology and Seismic Data Processing

Conference Location : Amsterdam, Netherlands

Conference Dates : August 06-07, 2019